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INFLUENCE OF 3D PRINTING PARAMETERS ON THE MECHANICAL PROPERTIES OF VETERINARY IMPLANTS USED FOR THE TREATMENT OF ACL RUPTURE

Keywords: ACL, Veterinary Implants, Biomaterials, 3D Printing, PLA

The most common injury in dogs, especially medium and large breeds, is an anterior cruciate ligament (ACL) rupture at the knee joint. In order to reconstruct an injury, it is possible to use innovative implants made with 3D printing technologies from biodegradable material. The implantation procedure consists in cutting the tibia and inserting a properly designed implant into the designated space. The selected material must be biocompatible and have an appropriate degradation rate to reduce the risk of reoperation, and the treated bone could regenerate and heal. Apart from the material, the properties of the implant are also influenced by the design and printing parameters. Therefore, the aim of this article was to assessment of 3D printing parameters on the properties of novelty implants construction. Used implants were made of polylactide (PLA) designed by Cabiomede. The geometry of the implants were adapted to medium breed dogs. Five types of implants, differing only in printing parameters, were printed using the FDM method. In order to reflect the real conditions, the implants were divided into: sterilization, 8-week and 12-week degradation in Ringer's solution. As part of the research, microscopic observations, surface wettability, roughness, Shore hardness and a static compression were carried out. Polymer equivalents of traditional metal implants can be successfully used in surgical procedures and they comply with the requirements of physicochemical and mechanical properties.